

Bjordal JM, Lopes-Martins R, et al. A systematic review with procedural assessments and meta-analysis of Low Level Laser Therapy in lateral elbow tendinopathy (tennis elbow). BMC Musculoskeletal Disorders 2008;9:75.

Design: systematic review/meta-analysis

Databases/selection and rating of articles:

- 13 randomized trials of low-level laser therapy (LLLT) of lateral epicondylitis
- Databases included Medline, EMBASE, CINAHL, PEDro, and Cochrane Controlled Trial Register; hand searches were done in physiotherapy and medical journals from several countries, and from researchers in the field
- Inclusion criteria were diagnosis of lateral elbow tendinopathy, LLLT with wavelengths in the range of 632-1064 nm, random parallel group or crossover design, with at least 10 persons in the control group, blinded assessment of outcome, and specific endpoints measured within 1-52 weeks after inclusion
- Pain outcomes were estimated as weighted mean differences of change scores on a 100 mm VAS between LLLT and control groups
- Global health status was defined to calculate the relative risk of success, defined as the probability that a patient had improved after treatment with LLLT or placebo

Main outcome measures:

- 1299 potential articles were screened, 180 full trial reports were evaluated, 18 were potentially appropriate for inclusion in meta-analysis, and 13 met all design and procedural criteria
- Of the 5 articles that were potentially appropriate for inclusion but were excluded from the analysis, one was excluded for having too small a sample, one for failing to have a specific endpoint and standard number of treatments, one for failing to use blinding, one for violating manufacturers' recommendation for use of the LLLT device, and one for lacking a non-LLLT control group
- There was considerable heterogeneity in treatment procedures and LLLT doses in the included trials; 7 trials using 904 nm and 1 trial using 632 nm wavelength showed LLLT superior to placebo, but 3 trials using 820 nm, 830 nm, and 1064 nm wavelength showed no significant effect of LLLT on global success of treatment
- Authors' presentation of results is complex, but pooled results for trials with adequate data showed that LLLT was more successful than placebo, and that wavelength influenced the result
- Specifically, wavelength of 904 nm was more successful immediately after treatment and at 3-8 week follow-up than was treatment with other wavelengths
- For global improvement at 8 weeks, the relative risk of improvement was 2.01 for the 904 nm wavelength treatment, and the pooled improvement in pain VAS was 14.3 mm on a 100 mm scale

- Publication bias was assessed using a funnel plot for all 18 trials that were considered potentially appropriate for inclusion in the meta-analysis; the funnel plot was asymmetrical in a way that suggested negative publication bias (negative results were more likely to be published than positive results)

Authors' conclusions:

- Low-level laser is safe and effective for lateral epicondylitis, acting in a dose-dependent manner
- At a wavelength of 904 nm, aimed at the tendon insertion of the lateral elbow, laser is an effective alternative to steroid injections and NSAID
- Some studies showing a lack of effect of laser may have had too high a dose, too high a power density, or inclusion of patients with poor prognoses

Comments:

- Although a dose-dependent effect is discussed, the optimum dose (in Joules) is not clear
- Wavelength of 904 nm appears to be favored over shorter and longer wavelengths, but this is not clearly related to dose in Joules
- Analysis of "negative" biases speculates that the inclusion of non-responders to treatment is likely to deflate effect sizes; however, this is not a "bias," and intention-to-treat is explicitly a part of the PEDro scale which the authors use to assess study quality
- Similarly, the authors speculate that exercise therapy as a co-intervention may deflate effect sizes or erase the positive effects of laser treatment; if exercise co-interventions are the same in both arms of an RCT, this is not a likely source of "bias"
- The PEDro scale assigns equal weights to criteria that may not deserve equal weights: concealment of allocation (a critical safeguard against bias) receives one point; blinding of all subjects, blinding of all therapists providing treatment, and blinding of all assessors of outcome are each worth one point on the PEDro scale
- This equal weighting of criteria is questionable, since blinding of patients and therapists to treatment is often not possible or reasonable
- One study (Oken et al 2008) was cited in Table 3 as having ++ results, but the between-groups comparisons in that article did not demonstrate significant differences

Assessment: Inadequate (dubious classification of biases, dubious interpretation of results of included studies, lack of definition of an optimum dose, when dose is stated as a crucial variable)